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PATENT ABSTRACTS OF JAPAN

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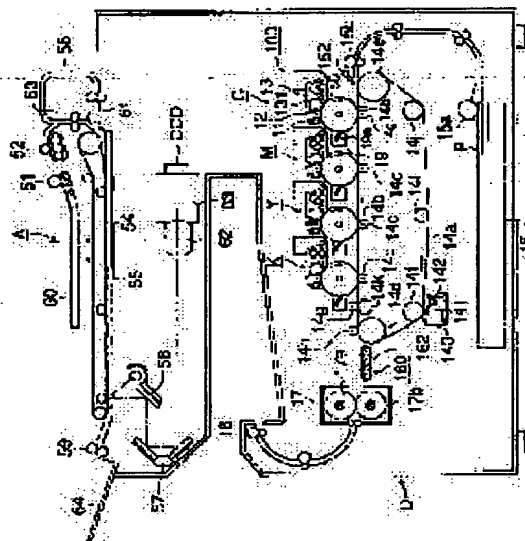
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(54) COLOR IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain high image quality free from a tone difference between color images formed on front and rear sides, as for a tandem color image forming device for fixing a transfer material with color toner images on both sides in a mass.

SOLUTION: As for the color image forming device for sequentially superposing toner images respectively formed on photosensitive drums 10 for respective colors (C, Y, M and K) functioning as an image forming body, the toner image is formed on the rear side of a recording paper P as a transfer material via a toner image receptor 14a as an intermediate transfer body, and also, as for the order of superposing color toner images, that is, cyan, yellow, magenta and black toner images, the cyan image is the first order and the black image is the last order, and the yellow image and the magenta image come between them in order.



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CLAIMS

[Claim(s)]

[Claim 1] Color-picture formation equipment with which the beginning and the last are characterized by for the order of superposition of a color toner image which consists of yellow, a Magenta, cyanogen, and black to be [for cyanogen, black, and the meantime] yellow and a Magenta in color-picture formation equipment which is made to pile up each other's toner image formed on an image formation object one by one, and forms a color picture while forming a toner image in both sides of imprint material through a medium imprint object.

[Claim 2] Color picture formation equipment according to claim 1 characterized by a toner image of said last being black.

[Claim 3] It is color picture formation equipment according to claim 1 or 2 characterized by changing the color correction by whether said toner image is a surface image formed in a front face of said imprint material, or it is the rear-face image formed in a rear face of said imprint material.

[Claim 4] Toner coating weight in case a toner image of said black becomes a lower layer is color picture formation equipment according to claim 3 characterized by making it size compared with toner coating weight in case a toner image of said black becomes the upper layer.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention arranges 4 sets of the image-formation object equipped with the electrification means, the image write-in means, the development means, and the cleaning equipment for every color on the outskirts on a medium imprint object, and relates to the color-picture formation equipment which can form a color picture especially in both sides of imprint material about the color-picture formation equipment of electrophotography methods, such as the copying machine which imprints the toner image which formed on the above-mentioned image-formation object on imprint material, and is established, a printer, and FAX.

[0002]

[Description of the Prior Art] Conventionally, the reliability of imprint material conveyance is high and the image formation equipment which obtains a double-sided image by one fixation with JP,49-37583,B, a 54-28740 official report, JP,1-44457,A, a 4-214576 official report, etc. after forming a toner image in both sides of imprint material, using an image formation object and a medium imprint object as double-sided image formation equipment which causes neither the jam of imprint material nor the wrinkling of imprint material is proposed.

[0003] Invention-in-this-application persons around an image formation object Moreover, an electrification means, an image write-in means, Once imprinting collectively the superposition color toner image which has arranged two or more sets of toner image formation means which consist of a development means etc., and was formed on the image formation object on a belt-like medium imprint object, Form a superposition color toner image on an image formation object again, and double the toner image on an image formation object and the toner image on a medium imprint object, and timing, and it is fed. A package imprint is carried out using the toner image on an image formation object as a surface image to both sides of the imprint material conveyed with a medium imprint object, respectively. Moreover, by using the toner image on a medium imprint object as a rear-face image, after carrying out a package imprint, imprint material is separated from a medium imprint object. Image formation equipment and the image formation method which are established in the toner image on imprint material, and form a double-sided color picture were indicated in JP,9-258492,A or JP,9-258516,A.

[0004] A belt-like medium imprint object is countered. Furthermore, the image formation object for every color, an electrification means, Two or more sets of toner image formation means which consist of an image write-in means, a development means, etc. are arranged. After once laying the color toner image formed on the image formation object for every above-mentioned color on top of a belt-like medium imprint object, imprinting it and forming a superposition color toner image, Double timing with the above-mentioned superposition color toner image, and a color toner image is again formed on the image formation object for every color. In the front face of the imprint material with which doubles the toner image and timing on a medium imprint object, and it is fed and which is conveyed with a medium imprint object Pile up the toner image on the image formation object formed again as a surface image, and it is imprinted. Moreover, after carrying out a package imprint at the rear face of imprint material by using the toner image on a medium imprint object as a rear-face image, it has proposed also about the double-sided color picture formation equipment of the so-called tandem die which separates imprint material from a medium imprint object, is established in the toner image on imprint material, and obtains a double-sided color picture.

[0005]

[Problem(s) to be Solved by the Invention] In the image formation equipment of this tandem die, although there is an advantage that image formation speed becomes early, the toner image formation sequence for every color was decided uniformly, and it cannot change. Therefore, by the surface image and rear-face image of a superposition toner image which were imprinted by imprint material, that order of a pile was reversed and, for this reason, the surface image and the rear-face image had the trouble that the color tone of a color picture will be different.

[0006] This invention solves the above-mentioned trouble and it aims at offering the color picture formation equipment which can obtain the image of the good image quality which does not have a difference in the color tone of the color picture of the front reverse side.

[0007]

[Means for Solving the Problem] In color picture formation equipment which is made to pile up each other's toner image formed on an image formation object one by one, and forms a color picture, while the above-mentioned object forms a toner image in both sides of imprint material through a medium imprint object The order of superposition of

a color toner image which consists of yellow, a Magenta, cyanogen, and black is attained for the beginning and the last by cyanogen, black, and color picture formation equipment with which the meantime is characterized by being yellow and a Magenta.

[0008] In addition, said color picture formation equipment characterized by a toner image of said last being black. Moreover, it is said color picture formation equipment characterized by changing the color correction by whether said toner image is a surface image or it is a rear-face image. Furthermore, said color picture formation equipment characterized by making toner coating weight in case a toner image of said black becomes a lower layer into size compared with toner coating weight in case a toner image of said black becomes the upper layer is a desirable embodiment.

[0009]

[Embodiment of the Invention] The color picture formation equipment which was made to be fixed to both sides which are examples of the gestalt of operation of this invention by forming a color picture is explained. In addition, explanation of the gestalt of operation of the following this inventions does not show the best mode, and limits neither the technical range of a claim, nor a terminological meaning. Moreover, in explanation of the following operation gestalten, the field of the imprint material of the side which counters a front face and the field of another side of imprint material, i.e., a medium imprint object, in the field of the imprint material of the side which counters an image formation object in an imprint region is called rear face, and the image which imprints the image imprinted on the front face of imprint material at the rear face of a surface image and imprint material is called rear-face image.

[0010] The configuration and operation of color picture formation equipment of 1 operation gestalt in connection with this invention are explained using drawing 1 and drawing 2. Drawing 1 is the cross-section block diagram of the color picture formation equipment in which 1 operation gestalt of the color picture formation equipment in connection with this invention is shown. Drawing 2 It is drawing showing the toner image formation condition of both sides of the color picture formation equipment in connection with this invention. Drawing 2 (A) Drawing where drawing which imprints the toner image formed in the image formation object on a medium imprint object, and forms a rear-face image, and drawing 2 (B) form a surface image in an image formation object synchronizing with the rear-face image on a medium imprint object, and drawing 2 (C) are drawings showing the double-sided image formation to an imprint material top.

[0011] In drawing 1, the color picture formation equipment shown with this operation gestalt consists of image read station A, the image-data-processing section B (graphic display abbreviation), and the image formation section D, the image-data-processing section B is equivalent to an image-processing means, and said image formation section D is equivalent to an image formation means for said image read station A at an image read means.

[0012] Image read station A makes possible image read recorded on both sides or one side (front face) of a manuscript, in image read station A, the laminating of the manuscript 60 is carried out to the order of a page from the upside by making a front face into facing up, it sells with the taking-out roller 51, and one manuscript 60 of the maximum upper layer is conveyed at a time towards the sequential conveyance way 53 by actuation of a roller 52.

[0013] It is made to evacuate to the location which eliminates the guide plate 61 energized by the location shown as a continuous line, and is shown with a dashed line, and paper is fed to the taken-out manuscript 60 on the platen glass 55 of the transparent body through the conveyance belt 54, and it stops to a manuscript reading station in the condition of having placed the front face upside down. A guide plate 61 returns to the location promptly shown as a continuous line after a manuscript's 60 passing.

[0014] The surface image of the manuscript 60 on platen glass 55 The 1st mirror unit 56 which consists of a lighting lamp which constitutes scan optical system, and the 1st mirror, The reading actuation by the speed V of the 1st mirror unit 56 of the 2nd mirror unit 57 which consists of the 2nd mirror located in the shape of V character, and the 3rd mirror, It is read by migration by speed $V / 2$ to this direction by the 2nd mirror unit 57, and image formation is carried out to the light-receiving side of the image sensor CCD which are three line sensors through the projection lens 62 and a dichroic prism 63. Photo electric translation of the optical image of the shape of a line which carried out color separation and which carried out image formation on the image sensor CCD is carried out to an electrical signal (luminance signal) one by one.

[0015] At image read station A, after reading of a surface image is completed, a manuscript 60 reverses the front reverse side through the reversal feeding way 58 by temporary counterrotation of the conveyance belt 54, and paper is again fed to it on platen glass 55 through the conveyance belt 54 through the conveyance way 53, and it stops to a manuscript reading station in the condition of having placed the rear face upside down.

[0016] According to the aforementioned scan optical system, the manuscript 60 on platen glass 55 is read, carries out color separation of the rear-face image, and photo electric translation is carried out to an electrical signal with an image sensor CCD.

[0017] Paper is delivered to the manuscript 60 which ended reading of the image on platen glass 55 so that a front face may be piled up in order of [bottom] a page in the upward condition on a tray 64 through the delivery roller 59 by actuation of the conveyance belt 54.

[0018] In the image-data-processing section B mentioned later, the picture signal (image data) of the manuscript image read by said image read station A is outputted to the image formation section D, after various image processings, such as concentration conversion, filtering, variable power processing, gamma amendment, and amendment processing of a table / reverse side image, are performed.

[0019] The photo conductor drum whose 10 is an image formation object for every color in the image formation

section D, The scorotron electrification machine whose 11 is an electrification means for every color, the exposure optical system whose 12 is an image write-in means for every color, The development counter whose 13 is a development means for every color, the toner image television object whose 14a is a medium imprint object, The imprint machine whose 14c is an imprint means for every color, the rear-face imprint machine whose 14g is a rear-face image imprint means, The paper separation AC electric discharge machine whose 14h is an imprint material separation means, the timing roller whose 15b is an imprint material supply means, The paper electrification machine whose 150 is an imprint material electrification means, the conveyance section which is a conveyance means by which 160 has a spur 162, The anchorage device whose 17 is a fixation means, the cleaning equipment whose 19 is an image formation object cleaning means for every color, and 140 are toner image television object cleaning equipment which is medium imprint object cleaning means.

[0020] In this operation gestalt the photo conductor drum 10 for every color, the scorotron electrification machine 11 for every color, the exposure optical system 12 for every color, and the development counter 13 for every color. The image formation unit 100 is constituted as these 1 sets. Cyanogen (C), A Magenta (M), yellow (Y), and 4 sets of image formation units 100 for every black (K) color are formed, and it is arranged in order of C, M, Y, and K according to the color and sequence which are formed to the hand of cut of toner image television object 14a rotated to the counterclockwise rotation shown by the arrow head of drawing 1. However, C, Y, M, K, and the beginnings, such as K, Y, M, C, or K, M, Y, C, and the last other than the above [this order of an array] should just be [cyanogen (C) black (K) and the meantime] yellow (Y) and a Magenta (M).

[0021] The photo conductor drum 10 which is an image formation object forms sensitization layers, such as a conductive layer, an a-Si layer, or an organic sensitization layer (OPC), in the periphery of the metal base of the shape of a cylinder formed for example, of aluminum material, and rotates to the clockwise rotation shown by the arrow head of drawing 1 where a conductive layer is grounded.

[0022] By the control grid held at predetermined potential, respectively, the toner by the corona discharge electrode, and the corona discharge of like-pole nature, the scorotron electrification machine 11 which is an electrification means for every color performs the electrization (it sets in this operation gestalt and is minus electrification), and gives uniform potential to the photo conductor drum 10. As a corona discharge electrode of the scorotron electrification machine 11, it is also possible to, use a serrate electrode and a needlelike electrode in addition to this.

[0023] The exposure optical system 12 which is an image write-in means for every color is arranged around the photo conductor drum 10, as the exposure location on the photo conductor drum 10 is located in the hand-of-cut downstream of the photo conductor drum 10 to the scorotron electrification machine 11 for every color mentioned above. The exposure optical system 12 for every color is a unit for exposure which consists of optical convergency optical transmission objects (trade name: selfoc-lens array) as the exposure element and image formation element of the line which arranged two or more LED (light emitting diode) as the drum shaft of the photo conductor drum 10, and a light emitting device of the image exposure light (image write-in light) arranged by parallel in the main scanning direction in the shape of an array. As exposure optical system 12, it is also possible to, use a laser beam study system in addition to this. The exposure optical system 12 for every color carries out image exposure of the sensitization layer of the photo conductor drum 10 according to the image data of each color which was read by image read station A and memorized by memory, and forms an electrostatic latent image on the photo conductor drum 10 for every color.

[0024] The development counter 13 which is a development means for every color maintains a predetermined gap to the peripheral surface of the photo conductor drum 10. The thickness of 0.5-1mm rotated to the hand of cut and the forward direction of the photo conductor drum 10, It had the development sleeve 131 formed by the nonmagnetic stainless steel or the nonmagnetic aluminum material of the shape of a cylinder with an outer diameter of 15-25mm, and the developer of cyanogen (C), yellow (Y), a Magenta (M) and one black (K) component, or two components is held in the interior according to the development color for every color. Un-illustrating dashes the development sleeve 131 of each development counter 13, it opens the photo conductor drum 10 and a predetermined gap, for example, 100-500 micrometers, by the koro, is maintained at non-contact, by impressing the development bias voltage which superimposed direct current voltage and alternating voltage to the development sleeve 131, performs contact or non-contact reversal development, and develops said electrostatic latent image on the photo conductor drum 10 in a toner image.

[0025] A volume resistivity toner image television object 14a which is a medium imprint object 1012 - 1015 ohm-cm, Surface electrical resistance is the endless belt of 1012 - 1015 ohm/cm². For example, denaturation polyimide, Thermosetting polyimide, an ethylene tetrafluoroethylene copolymer, polyvinylidene fluoride, Distributed the electrical conducting material to engineering plastics, such as a nylon alloy. It is the seamless belt of the two-layer configuration which performed fluorine coating with a thickness of 5-50 micrometers on the outside of a half-conductivity film base with a thickness of 0.1-1.0mm as a toner filming prevention layer preferably. If it considers as the base of toner image television object 14a, a half-conductivity rubber belt with a thickness of 0.5-2.0mm which distributed the electrical conducting material can also be used for silicone rubber or polyurethane rubber.

[0026] Toner image television object 14a is inscribed in and laid [firmly] across 14d of driving rollers, follower roller 14e, guide idlers 14f and 14j, rear-face imprint opposite roller 14k, and tension roller 14i, and rotates to the counterclockwise rotation shown by the arrow head of drawing 1. According to the hand of cut of toner image television object 14a, it is prepared in order of follower roller 14e, rear-face imprint opposite roller 14k, 14d [of driving rollers], and guide-idler 14f, tension roller 14i, and guide-idler 14j, and it fixes and rotates and follower roller

14e, rear-face imprint opposite roller 14k, 14d of driving rollers, and the guide idlers 14f and 14j of tension roller 14i are movable during a revolution by the elasticity of toner image television object 14a.

[0027] If 14d of driving rollers rotates in response to actuation [drive motor / non-illustrated], the actuation revolution of the toner image television object 14a will be carried out. The follower revolution of follower roller 14e, guide idlers 14f and 14j, rear-face imprint opposite roller 14k, and the tension roller 14i is carried out by the revolution of toner image television object 14a. The belt slack of toner image television object 14a under revolution becomes it tense by tension roller 14i.

[0028] On both sides of toner image television object 14a, imprint machine 14c which is an imprint means for every color counters with the photo conductor drum 10 for every color, is prepared, and forms imprint region 14b for every color between toner image television object 14a and the photo conductor drum 10 for every color. The direct current voltage of a toner and antipole nature (it sets in this operation gestalt and is plus polarity) is impressed to imprint machine 14c for every color, and the toner image on the photo conductor drum 10 for every color is imprinted by forming imprint electric field in imprint region 14b on a toner image television object 14a top or the front face of imprint material.

[0029] Moreover, it is prepared in conductive rear-face imprint opposite roller 14k grounded on both sides of toner image television object 14a face to face, the direct current voltage of a toner and antipole nature (it sets in this operation gestalt and it is plus polarity) is impressed, and 14g of the rear-face imprint machines which are a rear-face image imprint means bundles up the superposition color toner image supported on toner image television object 14a, and they imprint it at the rear face of imprint material.

[0030] 14d of driving rollers is countered, 14h of paper separation AC electric discharge machines which are an imprint separation means counters with guide-idler 14f again, and the toner image television object cleaning equipment 140 which is a medium imprint object cleaning means is formed.

[0031] The paper electrification machine 150 which is an imprint material electrification means is countered and formed in follower roller 14e grounded on both sides of toner image television object 14a, contact and contact discharge are possible for it to toner image television object 14a, is charged in imprint material, and is made to stick to toner image television object 14a by using a pivot 152 as the revolution supporting point. In addition, the paper electrification machine 150 may be a corona discharge machine estranged and formed.

[0032] 14d of conductive driving rollers grounded by the anchorage device 17 side-edge section of toner image television object 14a on both sides of toner image television object 14a together with 14g of rear-face imprint machines if needed is countered, it is prepared, the alternating voltage which superimposed the direct current voltage of a toner, like-pole nature, or reversed polarity is impressed, and 14h of paper separation AC electric discharge machines discharges the imprint material conveyed by toner image television object 14a. Separation from toner image television object 14a of imprint material is carried out to curvature separation of 14d of driving rollers, or curvature separation of 14d of driving rollers by using together an electric discharge operation of 14h of paper separation AC electric discharge machines.

[0033] The conveyance section 160 is formed between toner image television object 14a and an anchorage device 17, and a spur 162 is formed in the upper surface of the conveyance section 160. A spur 162 conveys the imprint material which has a toner image at the rear face to an anchorage device 17, preventing turbulence of a rear-face toner image while dipping up the imprint material which is going to be conveyed by bending in the direction of toner image television object 14a, in case imprint material is separated from toner image television object 14a.

[0034] An anchorage device 17 consists of two rollers of fixing roller 17a and sticking-by-pressure roller 17b which have a heater inside, and is established in the toner image on imprint material by applying heat and a pressure between fixing roller 17a and sticking-by-pressure roller 17b.

[0035] On both sides of toner image television object 14a, the toner image television object cleaning equipment 140 which is a medium imprint object cleaning means counters guide-idler 14f by the side of an anchorage device 17, is formed, and cleans the transfer residual toner on toner image television object 14a to toner image television object 14a by using a pivot 142 as the revolution supporting point by the toner image television object cleaning blade 141 in which contact and contact discharge are possible. It counters with guide-idler 14j by the side of penetration of imprint material, and toner image television object cleaning equipment 140 can also be prepared.

[0036] Next, a double-sided image formation process is explained. If the start of image recording is made, in image read station A, the image data of the manuscript image read by the image sensor or the image data of the image edited by computer will be processed in the image-data-processing section B explained later as a picture signal according to each color of C (cyanogen), M (Magenta), Y (yellow), and K (black).

[0037] It rotates to the clockwise rotation which the photo conductor drum 10 of the image formation unit 100 of cyanogen (C) shows by the arrow head of drawing 1 by start up of the photo conductor drive motor which is not illustrated by the start of image recording, and grant of potential is simultaneously started by the photo conductor drum 10 of C by the electrization of the scorotron electrification machine 11 of C.

[0038] After potential is given to the photo conductor drum 10 of C, the image writing (exposure) by the 1st chrominance signal about a rear-face image, i.e., the electrical signal corresponding to the image data of C, is started by the exposure optical system 12 of C, and the electrostatic latent image corresponding to the image of C of a manuscript image is formed in the sensitization layer of the front face of the photo conductor drum 10 of C.

[0039] Reversal development of the aforementioned latent image is carried out in the state of [non-contact] contact by the development counter 13 of C, and the toner image of cyanogen (C) is formed according to the revolution on the photo conductor drum 10 of C.

[0040] The toner image of C used as the rear-face image formed on the photo conductor drum 10 of C of the above-mentioned image formation process is imprinted by imprint machine 14c of C on toner image television object 14a in imprint region 14b of C.

[0041] Subsequently, the photo conductor drum 10 of M of the image formation unit 100 of a Magenta (M) Potential is given by the electrization of the scorotron electrification machine 11 of M, and the toner image of C on toner image television object 14a and a synchronization are taken. The image writing (exposure) by the 2nd chrominance signal, i.e., the electrical signal corresponding to the image data of M, is performed by the exposure optical system 12 of M, and the toner image of the Magenta (M) which serves as a rear-face image by the contact or the non-contact reversal development by the development counter 13 of M is formed. The toner image of this M is imprinted by imprint machine 14c of M on toner image television object 14a in imprint region 14b of M, and from on the toner image of said cyanogen (C), the toner image of M piles up and is formed.

[0042] According to the same process, said superposition toner image of C and M and synchronization are taken. The toner image of Y used as the rear-face image corresponding to the image data of Y by the 3rd chrominance signal formed on the photo conductor drum 10 of Y with the image formation unit 100 of yellow (Y) sets to imprint region 14b of Y. Of imprint machine 14c of Y, from on said superposition toner image of C and M, the toner image of Y piles up and is formed. Furthermore, the toner image of K used as the rear-face image corresponding to the image data of K by the 4th chrominance signal which the superposition toner image of C, M, and Y and synchronization were taken, and was formed on the photo conductor drum 10 of K with the black (K) image formation unit 100. In imprint region 14b of K, of imprint machine 14c of K, the toner image of K piles up, and is formed from on said toner image of C, M, and Y, and the superposition color toner image of four colors of C, M, Y, and K of a rear-face image is formed on toner image television object 14a (drawing 2 (A)).

[0043] The toner which remained on the peripheral surface of the photo conductor drum 10 for every color after an imprint results in the cleaning equipment 19 which is a photo conductor drum cleaning means, and is cleaned by cleaning-blade 19a which consists of the rubber material which contacted the photo conductor drum 10.

[0044] After the piled-up color toner image which turns into a rear-face image on toner image television object 14a as mentioned above is formed, the synchronization with the color toner image of the rear-face image currently succeeding supported by toner image television object 14a is taken, and the toner image of C which turns into a surface image of C with the image formation unit 100 of C is formed on the photo conductor drum 10 of C like the aforementioned color picture formation process. Under the present circumstances, image data is changed so that the surface image of C formed on the photo conductor drum 10 of C may turn into a mirror image to the rear-face image formed on the photo conductor drum 10 of said C.

[0045] In connection with the surface image formation of C to the photo conductor drum 10 top of C, from the sheet paper cassette 15 whose recording paper P which is imprint material is an imprint material receipt means. It is sent out by send roller 15a and conveyed to timing roller 15b as an imprint material feed means. By actuation of timing roller 15b The synchronization with the toner image of the surface image of C supported on the photo conductor drum 10 of C and the color toner image of the rear-face image currently supported by toner image television object 14a is taken, and imprint region 14b of C is fed. Under the present circumstances, paper electrification of the recording paper P is carried out at a toner and like-pole nature, toner image television object 14a is adsorbed by the brush-like paper electrification machine 150, and the head where it is considered as the contact condition and the direct current voltage of a toner and like-pole nature (it sets in this operation gestalt and is minus polarity) was impressed to the recording paper P is conveyed with it to imprint region 14b of C (drawing 2 (B)). By performing paper electrification to a toner and like-pole nature, it prevented paying well with the toner image on toner image television object 14a, and the toner image on the photo conductor drum 10 of C, and turbulence of a toner image is prevented. A corona-electrical-charging machine may be used instead of the brush-like paper electrification machine 150.

[0046] In imprint region 14b of C, the surface image on the photo conductor drum 10 of C is imprinted by imprint machine 14c of C to which the voltage of a toner and antipole nature (it sets in this operation gestalt and is plus polarity) was impressed on the front face of the recording paper P. At this time, the rear-face image on toner image television object 14a exists on toner image television object 14a without the recording paper's P imprinting.

[0047] Similarly the synchronization with the color toner image of a rear-face image and the toner image of the surface image of C which are supported by toner image television object 14a is taken. The toner image of the surface image of M, Y, and K is formed on the photo conductor drum 10 with each image formation unit 100. M, Y, and K — the toner image of the surface image of M, Y, and K — M, Y, and K — each imprint region 14b — a toner and antipole nature (in this operation gestalt) The sequential imprint of the color toner image of the surface image of M, Y, and K on each photo conductor drum 10 is carried out [the front face of the recording paper P] in the order of M, Y, and K by each imprint machine 14c to which the voltage of ** plus polarity was impressed at the toner image top of C. At this time, the rear-face image on toner image television object 14a exists on toner image television object 14a without the recording paper's P imprinting. Image data is changed so that the surface image of C, M, Y, and K which are formed on the photo conductor drum 10 of C, M, Y, and K may turn into a mirror image to the rear-face image formed on said photo conductor drum 10 of C, M, Y, and K, respectively.

[0048] The recording paper P with which the color toner image was imprinted by the front face is conveyed at a toner and 14g of rear-face imprint machines which impressed the voltage of antipole nature (it sets in this operation gestalt and is plus polarity), and the color toner image of the rear-face image on the peripheral surface of toner image television object 14a bundles it up with 14vessels of rear-face imprint machines, and it is imprinted by the

rear face of the recording paper P.

[0049] Moreover, contact discharge is carried out from toner image television object 14a just before passage of the back end of the recording paper P, or at passage and coincidence, and the paper electrification machine 150 is estranged with the recording paper P (drawing 2 (C)). Impression of the voltage to the paper electrification machine 15 is only a time of the recording paper P being sent, and the voltage currently impressed to alienation and coincidence with the recording paper P to the paper electrification machine 150 is disconnected.

[0050] According to the electric discharge operation of 14h of paper separation AC electric discharge machines as an imprint material separation means performed by next using together with curvature separation curvature separation of 14d of driving rollers, or if needed, it dissociates from toner image television object 14a, and the recording paper P with which the color toner image was imprinted by both sides is conveyed to an anchorage device 17 through the conveyance section 160 in which the spur 162 was formed. ***** to which the recording paper P applies heat and a pressure in an anchorage device 17 between fixing roller 17a and sticking-by-pressure roller 17b — things are fixed to the toner image on the rear face of a table of the recording paper P, the image of the front reverse side is reversed and sent and the recording paper P with which double-sided image recording was made is discharged with the delivery roller 18 to the tray of the equipment exterior.

[0051] The toner which remained on the peripheral surface of toner image television object 14a after an imprint uses as the revolution supporting point the pivot 142 which countered guide-idler 14f and was prepared on both sides of toner image television object 14a, and the contact and the contact discharge to toner image television object 14 a are possible for it, and it is cleaned by the toner image television object cleaning blade 141 of the toner image television object cleaning equipment 140 made into a contact condition at toner image television object 14a.

[0052] Moreover, cleaning-blade 19a of cleaning equipment 19 removes a residual toner, the hysteresis on the photo conductor drum 10 by previous image formation is canceled with the uniform photographic filter before non-illustrated electrification, and the toner which remained on the peripheral surface of the photo conductor drum 10 for every color after an imprint is in the following image formation cycle.

[0053] Of course, also do single-sided image formation which forms an image in one side of only the front face of imprint material, or a rear face other than the double-sided image formation which forms an image in both sides of imprint material which was explained with the above-mentioned operation gestalt with above double-sided image formation equipment.

[0054] Here, the circuitry of the above color picture formation equipment which consists of said image read station A, the image-data-processing section B, and the image formation section D is explained according to the block diagram of drawing 3 and drawing 4.

[0055] First, in image read station A, the analog picture signal of three colors which are outputted from the aforementioned image sensor CCD and which carried out color separation is changed into a digital image signal (image data) by A/D converter B11, and is outputted to the image-data-processing section B through an interface B12 by it.

[0056] The digital image signal (luminance signal) inputted into the image-data-processing section B is first changed into concentration information by the concentration conversion B13.

[0057] And variable power processing according to variable power assignment of a user is performed by the zooming processing B14. Moreover, in the image distinction processing B15, based on the concentration information changed by said concentration conversion B13, alphabetic character drawing and photograph drawing are distinguished, the filter shape in filtering B16 is set up based on this distinction result, and spatial filter processing is performed by filtering B16 according to said setting out.

[0058] In addition, said image distinction processing B15 shall be equivalent to the image distinction means and processing property adjustable means in this operation gestalt, and distinction of alphabetic character drawing and photograph drawing shall include distinction of the alphabetic character image field in the mixture image of alphabetic character drawing and photograph drawing, and a photograph field.

[0059] Here, in order to replace filtering and variable power processing and to make them perform according to assignment of zooming, the data selectors B17 and B18 of a couple are formed. The exchange with said filtering and variable power processing is performed in order to prevent the moire of the halftone dot drawing looked at by the image at the time of cutback processing.

[0060] On the other hand, the EE processing B19 obtains histogram data, in order to acquire the feature of a manuscript image from the image information obtained by the PURISU can before this scan. And CPU of the image-processing system which is not illustrated provides gamma amendment processing B20 with proper gamma amendment data based on said histogram data.

[0061] The image data (concentration information) to which filtering and variable power processing were performed is outputted to the image field processing B21, after gamma amendment according to the property of the image formation equipment B25 later mentioned by the aforementioned gamma amendment processing B20 is performed. said image field processing B21 — others [extract / of the effective image field of a manuscript] — ****(ing) — ***** (ing) — etc. — field processing is also performed.

[0062] The image data (concentration information) which changed into the final output condition to the image formation equipment B25 which all image processings required for image formation are performed as mentioned above, and is mentioned later is outputted to the image formation section D through an interface B22.

[0063] In the image formation section D, with the function to carry out image formation to the photo conductor drum 10 top to real time to the read of a manuscript The data selector B91 which reads the image data which

carries out two or more storage maintenance of the inputted image data in the image storage section B23, and was this memorized afterwards to arbitration. It has the image amendment processing B92 in which image amendment is performed corresponding to a table/reverse side, and the function to make image formation perform from the amended image data.

[0064] Here, with this operation gestalt, the function to read selectively the image data which a manuscript image is read as mentioned above, it is obtained, and ** also saves the image data to which all required image processings were performed, and was this saved afterwards, and to make image formation perform shall be called an electronic RDH function.

[0065] In order to realize said electronic RDH function other than the image formation equipment B25 which is a laser beam printer etc. in the image formation section D, While the image storage section B23 (image data storage means) memorized possible [rewriting of image data] is formed The data selector B91 for assigning the image data of a switch, a front face, and a rear face for said electronic RDH function and the usual real-time image formation function and the image amendment processing B92 in which image amendment corresponding to a table/reverse side is performed are formed.

[0066] Said data selector B91 outputs selectively the image data by which reading appearance was carried out from the image storage section B23, or the image data serially outputted according to reading from the image-data-processing section B to image formation equipment (laser beam printer) B25.

[0067] namely, the image data from the image-data-processing section B which the image data of the same final output condition as the time of it being usually alike and making a real-time operation perform is memorized, and is selectively outputted by said data selector B91, and the image data which carried out reading appearance from the image storage section B23 are equally treated by said image storage section B23 in image formation equipment B25, and can perform image formation now in it.

[0068] With the image formation equipment of this invention, as for a rear-face image, the imprint to a toner image television object from an image formation object and two imprints to imprint material from a toner image television object are performed. On the other hand, as for a surface image, one imprint to imprint material from an image formation object is performed. When about 10% of toner coating weight falls at once on the occasion of these imprints, and performing an image processing on these conditions, compared with a surface image, as for a rear-face image, image concentration becomes low. moreover, the toner image according to two imprints with a rear-face image — breaking up — gradation nature changes. Furthermore, by the color picture, a toner image laps, and since the sequence of doubling is reversed on imprint material as shown in drawing 5, a color tone changes with a front face and the rear face. Although the amount of UCR(s) is calculated from the mixing ratio of Y, M, and C3 color, since there is an inclination for K (black) used as the maximum upper layer to be emphasized too much if it is in a surface image, the thing which the amount of UCR(s) is changed in color reproduction, or like K component compared with a rear face and to abolish is needed with a surface image and a rear-face image.

[0069] Moreover, although the cyanogen (C) of the toner of a color developer, a Magenta (M), and the ideal spectral reflectance of yellow (Y) need to have the property shown in drawing 7, the spectral reflectance of a actual typical toner has a property as shown in drawing 6.

[0070] Especially a color-balance has a bad absorption property unnecessary to a green field, and a cyanogen (C) toner has lightness low close to black. Therefore, effect by the stacking-order foreword of a toner being reversed with the surface image and rear-face image at the time of double-sided image formation can be lessened by making it put on black (K), the beginning of four colors which pile up cyanogen (C), and the last.

[0071] As this operation gestalt is shown in drawing 4, in the color processing B921 of the image amendment processing B92, it is carried out including color processing of masking and inking, UCR, etc. in the masking section. In case linearity masking or the advanced color correction generally performed as masking is performed, nonlinear masking and masking which used the look-up table are used. Each sets up beforehand the parameter for masking for this color correction to the surface image and the rear-face image, and a setting-out change of a parameter is made according to a front face or a rear face. Such color processing, gamma conversion, and filtering are performed in the color processing B921, gamma conversion, and filtering B922, and the output to C, M and Y of image formation equipment B25, and the exposure optical system 12 of K each color is performed through the multiple-value-ized processing B923 of a screen angle, a dither, error diffusion, etc. After such image amendment processing is performed in the image amendment processing section B92, formation of the double-sided image with which image concentration and a color tone were ready is performed. Since a rear-face image performs 2 times of imprint processes, gamma tends to become high to a surface image, and resolution also tends to fall. It also has the function which amends this.

[0072] Moreover, that what is necessary is for color correction to be unnecessary at the time of a monochrome image, and to perform gamma amendment, and filtering and concentration amendment only to a rear-face image, if the black (K) maximum concentration is saturation image concentration, and a setting-out change of a parameter is made only about gamma amendment and filtering, the double-sided image with which the difference in the front reverse side is not accepted will be obtained.

[0073] Moreover, although mirror image transform processing of image data has composition performed in a data selector B91 in said explanation, it is also possible to make mirror image transform processing into the circuitry included into the parameter which makes a setting-out change according to the front face or rear face in the image amendment processing B92.

[0074] As mentioned above, it is general to add the black (K) toner other than the toner of three colors of cyanogen

(C), a Magenta (M), and yellow (Y) to color picture formation. It is because this improves the repeatability in the shadow section by concentration supplement in the high concentration section, the consumption of a color toner is cut down, the endurance of a color is raised by adding a little black (Y) toner and repeatability, such as an alphabetic character, is raised. The actuation which takes and removes a gray component from 3 color toner, and is replaced with a black (K) toner is called lower color clearance or UCR. Usually, 100% or less is used as UCR.

[0075] Since K toner is covered with M toner, Y toner, or C toner when a cyanogen (C) toner becomes the maximum upper layer and a black (K) toner becomes the lowest layer, compared with the case where a black (K) toner becomes the maximum upper layer, it will look palely. Therefore, when a black (K) toner becomes the lowest layer, adjustment which makes black (K) toner coating weight size, or enlarges UCR (lower color clearance) is performed.

[0076] Sequence of the color of image formation is performed in order of C, M, Y, and K. However, in short, the beginning and the last other than the above [this sequence] should just be [cyanogen (C) black (K), and the meantime] yellow (Y) and a Magenta (M) with K, Y, M, C, C, Y, M, K, or K, M, Y and C.

[0077] Since it becomes early to arrange in the style of [of the conveyance direction of toner image television object 14a] the lowest, its print speed is [the image formation unit 100 of K] desirable [considering the thing of (Black K) monochrome mode print with high frequency,].

[0078]

[Effect of the Invention] When based on this invention, in the tandem-die color picture formation equipment which carries out package fixation of the imprint material which held the color toner image to both sides, the possible color picture formation equipment of acquiring the very good image quality which does not have a difference in the color tone of the color picture of the front reverse side will be offered. Moreover, when based on claim 2, since the image formation unit 100 of K is arranged in the style of [of the conveyance direction of toner image television object 14a] the lowest, the effect which carries out print speed at the time of a monochrome black print early produces it.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the cross-section block diagram showing an example of the image formation equipment of this invention.

[Drawing 2] It is explanatory drawing showing supply of a toner image formation condition and imprint material.

[Drawing 3] It is the block diagram showing an example of a circuit used for this invention.

[Drawing 4] It is the block diagram showing the details of image amendment processing of drawing 3.

[Drawing 5] It is explanatory drawing showing the stacking order of each color toner in the front reverse side of imprint material.

[Drawing 6] It is the graph which shows the spectral-reflectance curve of each color toner used.

[Drawing 7] It is the graph which shows the spectral-reflectance curve of each ideal color toner.

[Description of Notations]

10 Photo Conductor Drum (Image Formation Object)

11 Scorotron Electrification Machine

12 Exposure Optical System

13 Development Counter

14a Toner image television object (medium imprint object)

14c Imprint machine

14g Rear-face imprint machine

14h Paper separation AC electric discharge machine

17 Anchorage Device

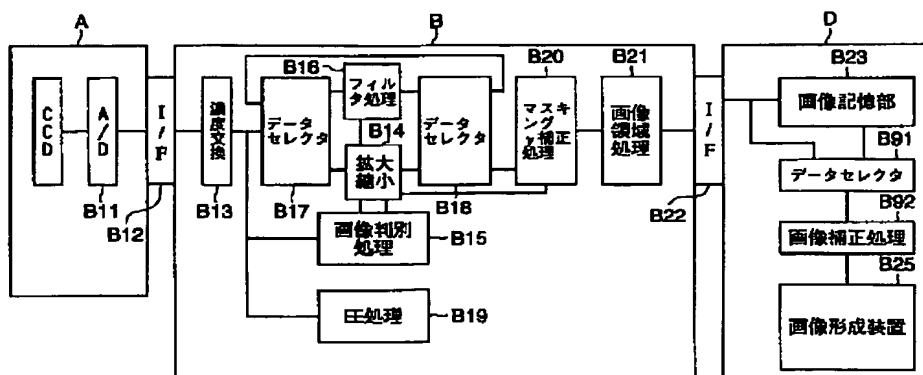
A Image read station

B Image-data-processing section

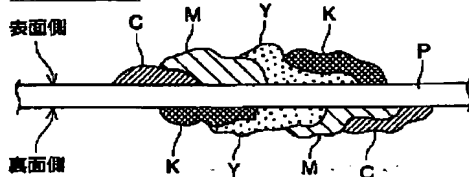
D Image formation section

P Recording paper (imprint material)

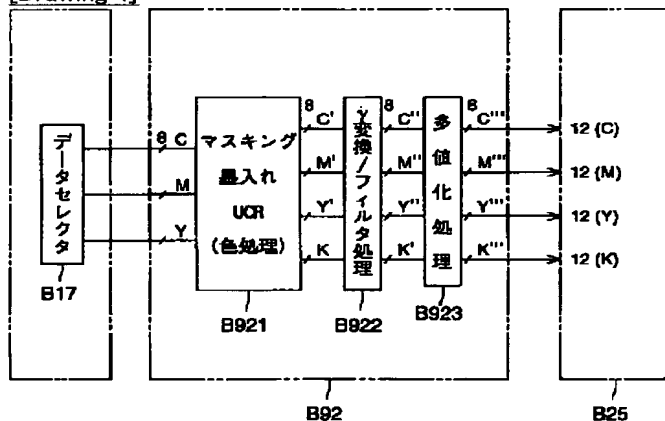
[Translation done.]



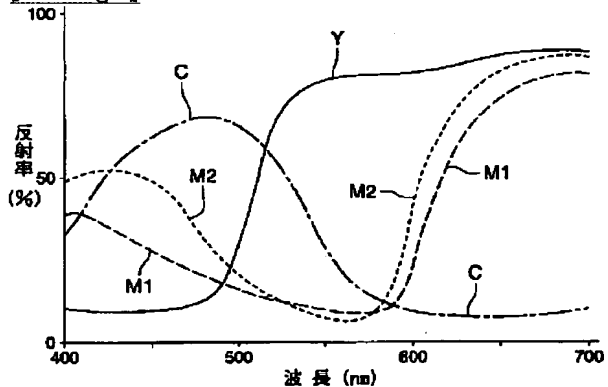
[Drawing 5]



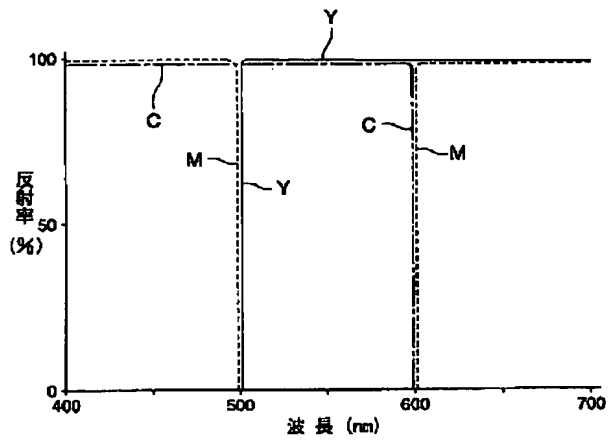
[Drawing 4]



[Drawing 6]



[Drawing 7]



[Translation done.]

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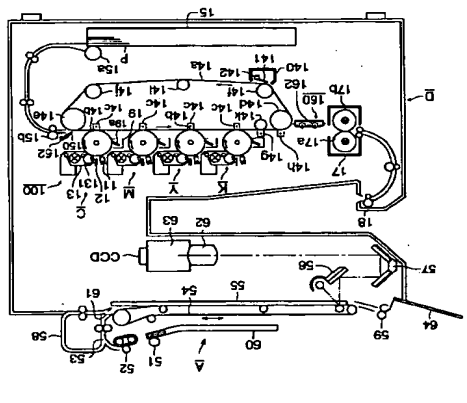
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		Fターム(参考)	2H027 EA05 E904 E320 2H028 BA06 BA18 B802 B000 2H030 AA01 AA02 AB02 AD08 AD12 AD10 B834 B836 B842 B863

(54)【発明の名称】 カラー画像形成装置

(57)【要約】
【課題】 画面上にカラートナー像を保持した転写材を一括転写するタンデム型カラー画像形成装置において、表裏のカラー画像の色味に差のない良好な画質を得ること。

【解決手段】 像形成体である各色毎の感光体ドラム10(C、Y、M、K)上に形成されたトナー像を順次重ね合わせるカラー画像形成装置において、中間転写体であるトナー像受容体14aを介して転写材である記録紙Pの裏面にトナー像を形成するとともに、シアン、イエロー、マゼンタ、黒からなるカラートナー像の重ね合わせ順が、最初と最後がシアンと黒、その間がイエローとマゼンタであることを特徴とする。



【発明の概要】

【請求項1】 像形成体上に形成されたトナー像を順次重ね合わせてカラー画像を形成するカラー画像形成装置において、中間転写体を介して転写材の画面上にトナー像を形成するとともに、イエロー、マゼンタ、シアン、黒からなるカラートナー像の重ね合わせ順が、最初と最後がシアンと黒、その間がイエローとマゼンタであることを特徴とするカラー画像形成装置。

【請求項2】 前記最後のトナー像が黒であることを特徴とする請求項1に記載のカラー画像形成装置。

【請求項3】 前記トナー像は前記転写材の裏面に形成される裏面画像であるか又は前記転写材の裏面に形成される裏面画像であるかによって、その色補正を変更することを特徴とする請求項1又は2に記載のカラー画像形成装置。

【請求項4】 前記黒のトナー像が下層になるときのトナー付着量は、前記黒のトナー像が上層になるときのトナー付着量に比べて大にすることを特徴とする請求項3に記載のカラー画像形成装置。

【発明の詳細な説明】

【0001】
【発明の属する技術分野】 本発明は、周知に各色毎の帯電手段と画像露光手段と現像手段とクリーニング装置とを備えた像形成体の4組を中間転写体上に配置して、上記像形成体上に形成したトナー像を転写材上に転写、定着する複写機、プリンタ、FAX等の電子写真方式のカラー画像形成装置に関し、特に転写材の画面上にカラー画像を形成することができるカラー画像形成装置に関する。

【0002】
【従来の技術】 従来、転写材搬送の信頼性が高く、転写材のジヤムや転写材のしわ等を引き起こすことのない画像形成装置として、特公昭49-37583号公報、同54-28740号公報、特開平1-44457号公報、同4-214576号公報等により、像形成体と中間転写体とを用いて転写材の画面上にトナー像を形成したのち、1回の定着で両面画像を得る画像形成装置が提案されている。

【0003】 また本願発明者らは、像形成体の周りに、帯電手段、画像露光手段、現像手段等よりなるトナー像形成手段を複数配置し、像形成体上に形成した重ね合わせカラートナー像を一旦ベルト状の中間転写体に一括して転写したのち、再度像形成体上に重ね合わせカラートナー像を形成し、像形成体上のトナー像及び中間転写体上のトナー像とタイミングを合わせて給送され、中間転写体上より搬送される転写材の画面上にそれぞれ、像形成体上のトナー像を裏面画像として一括転写し、また中間転写体上のトナー像を裏面画像として一括転写したのち、中間転写体から転写材を分離し、転写材上のトナー像を定着して両面カラー画像を形成する画像形成装置

や画像形成方法を特開平9-258492号公報や特開平9-258516号公報にて開示した。

【0004】 さらに、ベルト状の中間転写体に対して、各色毎の像形成体、帯電手段、画像露光手段、現像手段等よりなるトナー像形成手段を複数配置し、上記各色毎の像形成体上に形成したカラートナー像を一旦ベルト状の中間転写体に重ね合わせて転写し、重ね合わせカラートナー像を形成したのち、上記重ね合わせカラートナー像にタイミングを合わせて、各色毎の像形成体上に再度カラートナー像を形成し、中間転写体上のトナー像とタイミングを合わせて給送され、中間転写体上より搬送される転写材の裏面には、再度形成した像形成体上のトナー像を裏面画像として重ね合わせて転写し、また中間転写体上のトナー像を裏面画像として転写材の裏面に一括転写したのち、中間転写体から転写材を分離し、転写材上のトナー像を定着して両面カラー画像を得る、いわゆるタンデム型の両面カラー画像形成装置についても提案している。

【0005】

【0006】 本発明は上記の問題点を解決し、表裏のカラー画像の色味に差のない良好な画質の画像を得ることのできるカラー画像形成装置を提供することを目的とする。

【0007】

【課題を解決するための手段】 上記目的は、像形成体上に形成されたトナー像を順次重ね合わせてカラー画像を形成するカラー画像形成装置において、中間転写体を介して転写材の画面上にトナー像を形成するとともに、イエロー、マゼンタ、シアン、黒からなるカラートナー像の重ね合わせ順が、最初と最後がシアンと黒、その間がイエローとマゼンタであることを特徴とするカラー画像形成装置によって達成される。

【0008】 なお、前記最後のトナー像が黒であることと特徴とする前記カラー画像形成装置。また、前記トナー像は裏面画像であるか又は裏面画像であるかによって、その色補正を変更することを特徴とする前記カラー画像形成装置。さらに、前記黒のトナー像が下層になるときのトナー付着量は前記黒のトナー像が上層になるときのトナー付着量に比べて大にすることを特徴とする前記カラー画像形成装置は好ましい実施態様である。

【0009】

【発明の実施の形態】 本発明の実施の形態の一例である

面にカラー画像を形成して定着を行うようにしたカラー一面像形成装置について説明する。なお、以下の本発明の実施形態の説明は、ベストモードを示すものであつて、請求項の技術的範囲や用語の意味を限定するものではない。また、以下の実施形態の説明において、転写部材の他方面すなわち中間転写体に対する側の転写部材の面を裏面といひ、転写部材の表面に転写する側の面を表面、転写部材の裏面に転写する画像を裏面画像といふ。

【0010】本発明にかかわるカラー一面像形成装置の一実施形態の構成と作用について、図1及び図2を用いて説明する。図1は本発明にかかわるカラー一面像形成装置の一実施形態を示すカラー一面像形成装置の断面構成図であり、図2は、本発明にかかわるカラー一面像形成装置の裏面のトナー像形成状態を示す図であり、図2(A)は、像形成体14が形成したトナー像を中間転写体14に転写し裏面画像を形成する図、図2(B)は、中間転写体上の裏面画像と同様に像形成体に表面画像を形成する図、図2(C)は、転写部材上の表面画像を形成する図である。

【0011】図1において、本実施形態で示すカラー一面像形成装置は、画像読取り部A、画像データ処理部B(図示省略)、画像形成部Dで構成され、前記画像読取り部Aが画像読取り手段に、画像データ処理部Bが画像処理手段に、また、前記画像形成部Dが画像形成手段に相当する。

【0012】画像読取り部Aは原稿の面又は片面(表面)に配装された画像読取りを可能とするもので、画像読取り部Aにおいて、原稿60は表面を上向きとして上側よりベレーン類に配置されており、搬送ローラ51とさきローラ52の作用により最上層の原稿60は1枚ずつ順次搬送路53に向け搬送される。

【0013】搬出された原稿60は実線にて示す位置に付勢されているガイド板61を排除して破線にて示す位置に退避させ、搬送ベルト54を介して透明体のガラス転写部材55上に給紙されて、表面を下向きにした状態で原稿読取り位置に一時停止される。ガイド板61は原稿60が通過後直ちに実線にて示す位置に戻る。

【0014】プラテンガラス55上の原稿60の表面画像は、走査光学系を構成する照明ランプと第1ミラーからなる第1ミラーユニット56と、V字状に位置した第2ミラーと第3ミラーからなる第2ミラーユニット57の、第1ミラーユニット56の速度Vによる読み取り動作と、第2ミラーユニット57による同方向への速度V/2による移動により読み取られて、撮影レンズ62とダイクロイックプリズム63を通して3個のラインセンサで有る撮像素子CCDの受光面に結像される。色分離して撮像素子CCD上に結像したライン状の光学像は順次電気信号(輝度信号)に光電変換される。

【0015】画像読取り部Aでは表面画像の読み取りが終了すると、原稿60は搬送ベルト54の一時的な逆回転により反転給紙路58を経て表裏を反転し、再び搬送路53を経て搬送ベルト54を介してプラテンガラス55上に給紙され、裏面を下向きにした状態で原稿読取り位置に一時停止される。

【0016】プラテンガラス55上の原稿60は裏面画像を前記の走査光学系によって読み取り、色分離して撮像素子CCDによって電気信号に光電変換される。

【0017】プラテンガラス55上での画像の読み取りを終了した原稿60は、搬送ベルト54の動作により非線ローラ59を介してトレイ64上に表面を上向きの状態で下側よりベレーン類に積み重ねるように非転送される。

【0018】前記画像読取り部Aで読み取られた表面画像の電気信号(画像データ)は、後述する画像データ処理部Bにおいて、濃度変換、フィルタ処理、変倍処理、γ補正、表/裏面画像の補正処理などの各種画像処理が施されたのち、画像形成部Dに出力される。

【0019】画像形成部Dにおいて、10は各色毎の像形成体である感光体ドラム11は各色毎の帯電手段であるススロトロン帯電器、12は各色毎の画像読み取り手段である露光光学系、13は各色毎の現像手段である露光光学系、14は中間転写体であるトナー像受像体、14aは各色毎の転写手段である転写器、14gは表面画像形成手段である裏面転写器、14hは転写材供給手段である紙分給AC除電器、15bは転写材帯電手段である紙帯電器、160は拍車162を有する搬送手段である搬送部、17は定着手段である定着装置、19は各色毎の像形成体クリーニング手段であるクリーニング装置、140は中間転写体クリーニング手段であるトナー像受像体クリーニング装置である。

【0020】本実施形態においては、各色毎の感光体ドラム10、各色毎のススロトロン帯電器11、各色毎の露光光学系12及び各色毎の現像器13は、これら1組として画像形成ユニット100を構成し、シアン(C)、マゼンタ(M)、イエロー(Y)、及び黒(K)の各色毎の画像形成ユニット100を4組設けて、図1の矢印にて示す反時計方向に回転されるトナー像受像体14aの回転方向に対して、形成される色と順次に対応してC、M、Y、Kの順に配置される。ただし、この配列順は上記の他にC、Y、M、Kと、K、Y、M、CあるいはK、M、Y、Cなど、最初と最後がシアン(C)と黒(K)、その間がイエロー(Y)とマゼンタ(M)であればよい。

【0021】像形成体である感光体ドラム10は、例えば、アルミニウム材によって形成される円筒状の金属基体の外周に、導電層、a-Si層あるいは有機感光層(OPC)等の感光層を形成したものであり、導電層を接地した状態で図1の矢印で示す時計方向に回転され

【0022】各色毎の帯電手段であるススロトロン帯電器11は、それぞれ所定の電位に保持された制御グリッドとコロナ放電電極によるトナーと同極性のコロナ放電とによって帯電作用(本実施形態においてはマイナス帯電)を行い、感光体ドラム10に対して一様な電位を与え、ススロトロン帯電器11のコロナ放電電極とすれば、その他給電状態や針状電極を用いることも可能である。

【0023】各色毎の画像読み取り手段である露光光学系12は、感光体ドラム10上での露光位置が、前述した各色毎のススロトロン帯電器11に対して感光体ドラム10の回転方向下流側に位置するようにして感光体ドラム10の周辺に配置される。各色毎の露光光学系12は、感光体ドラム10のドラム軸と平行に主走査方向に配列された露光光学系(画像読み取り)の露光素子としての例えばLED(発光ダイオード)を複数個アレイ状に並べた線状の露光素子と、結像素子としての光収束性光伝送体(商品名:セルフオックレンズアレイ)とで構成される露光用ユニットとして、露光光学系12として、その他レーザ光学系を用いることも可能である。各色毎の露光光学系12は、画像読取り部Aによって読み取られた露光データに基いて各色の画像データに従って感光体ドラム10の感光層を露光し、各色毎の感光体ドラム10上に静電像を形成する。

【0024】各色毎の現像手段である現像器13は、感光体ドラム10の周囲に所定の距離を隔て、感光体ドラム10の回転方向と順方向に回転する例えば厚み0.5~1mm、外径15~25mmの円筒状の非磁性のステンレス鋼あるいはアルミニウム材で形成された現像スリーブ131を有し、内部に各色毎の現像色に従いシアン(C)、イエロー(Y)、マゼンタ(M)、および黒(K)の成分あるいは2成分の現像剤を収容している。それぞれの現像器13の現像スリーブ131は、不図示の矢印で示すように感光体ドラム10と所定の距離、例えば100~500μmをあけて非接触に保持されており、現像スリーブ131に対して直流電圧と交流電圧を重畳した現象ヘイアス電圧を印加することにより、接触又は非接触の反転現象を行い、感光体ドラム10上の帯電静電像をトナー像に顕像化する。

【0025】中間転写体であるトナー像受像体14aは、体抵抗率が10¹²~10¹⁵Ω・cm、表面抵抗が10¹²~10¹⁵Ω/cm²の無塵・ペルトであり、例えば変性ポリイミド、熱硬化性ポリイミド、エポキシ樹脂、フルオロエチレン共重合体、ポリフッ化ビニリデン、ナロンアロイ等のエンジニアリングプラスチックに導電材料を分散した、厚さ0.1~1.0mmの半導電性フィルム基体の外側に、好ましくはトナーフィラミニング防止層として厚さ5~50μmのフッ素コーティングを行った、2層構成のシーラスペルトである。トナー像受

像体14aの基体としては、この他に、シリコンゴムあるいはウレタンゴム等に導電材料を分散した厚さ0.5~2.0mmの半導電性ゴムペルトを使用することもできる。

【0026】トナー像受像体14aは、駆動ローラ14d、従動ローラ14e、ガイドローラ14f、14j、表面転写方向ローラ14k及びデレンションローラ14iに内接して環状され、図1の矢印で示す反時計方向に回転される。トナー像受像体14aの回転方向に従って駆動ローラ14e、表面転写方向ローラ14k、駆動ローラ14d、ガイドローラ14f、デレンションローラ14i、ガイドローラ14jの順に設けられ、従動ローラ14e、表面転写方向ローラ14k、駆動ローラ14d及びガイドローラ14f、14jは固定して回転され、デレンションローラ14iはトナー像受像体14aの弾力により回転中に移動可能である。

【0027】不図示の駆動モータよりの駆動をうけて駆動ローラ14dが回転すると、トナー像受像体14aが駆動ローラ14dの回転により、トナー像受像体14aの回転により従動ローラ14e、ガイドローラ14f、14j、表面転写方向ローラ14k及びデレンションローラ14iが従動して回転される。回転中のトナー像受像体14aのベルト縁がデレンションローラ14iにより緊張される。

【0028】各色毎の転写手段である転写器14cはトナー像受像体14aを挟んで各色毎の感光体ドラム10と対向して設けられ、トナー像受像体14aと各色毎の感光体ドラム10との間に各色毎の転写器14bを形成する。各色毎の転写器14cにはトナーと反対極性(本実施形態においてはプラス極性)の直流電圧を印加し、転写器14bに転写電界を形成することにより、各色毎の感光体ドラム10上のトナー像をトナー像受像体14a上又は転写材の表面に転写する。

【0029】また、表面画像転写手段である表面転写器14gは、トナー像受像体14aを挟んで接地された導電性の表面転写方向ローラ14kに対向して設けられ、トナーと反対極性(本実施形態においてはプラス極性)の直流電圧が印加され、トナー像受像体14a上に保持される重なる合致カラートナー像を一括して転写材の裏面に転写する。

【0030】駆動ローラ14dに対向して転写分離手段である紙分給AC除電器14hが、また、ガイドローラ14fと対向した中間転写体クリーニング手段であるトナー像受像体クリーニング装置140が設けられる。

【0031】転写材帯電手段である紙帯電器150はトナー像受像体14aを挟んで接地された従動ローラ14eに対向して設けられ、支軸152を回転点としてトナー像受像体14aに当接及び当接後解除可能であり、転写材を帯電してトナー像受像体14aに吸着させる。なお紙帯電器150は離開して設けたコロナ放電器であつてもよい。

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【0032】紙分離AC除電器14hは必要に応じて帯面転写器14aと並んでトナー像受像体14aの定着装置17側端部にトナー像受像体14aを嵌んで後述された導電性の転写ローラ14dに對向して設けられ、トナー像受像体14aにより搬送される転写ローラ14dの曲率分離開除電器14hの除電作用を併用して行われる。

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【0040】上記の画像形成プロセスによってCの感光体ドラム10上に形成された裏面画像となるCのトナー像がCの転写器14bにおいて、Cの転写器14cによってトナー像受像体14a上に転写される。

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【0041】次に、マゼンタ(M)の画像形成ユニット100のMの感光体ドラム10は、Mのスピンコート電器11の帯電作用により電位が付与され、トナー像受像体14a上のCのトナー像と同期が取られ、Mの露光光学系12によって第2の色番号すなわちMの画像データに対応する電気信号による画像露光(露光)が行われ、Mの現像器13による露光又は非接触の反転現象によって裏面画像となるマゼンタ(M)のトナー像が形成される。このMのトナー像は、Mの転写器14bにおいてMの転写器14cによってトナー像受像体14a上に転写され、前記シアン(C)のトナー像の上からMのトナー像を重ね合わせて形成される。

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【0042】同様のプロセスにより、前記C、Mの重ね合わせトナー像と同期が取られ、イエロー(Y)の画像形成ユニット100によりYの感光体ドラム10上に形成された、第3の色番号によるYの画像データに対応する裏面画像となるYのトナー像が、Yの転写器14bにおいて、Yの転写器14cによって、前記C、Mの重ね合わせトナー像の上からYのトナー像を重ね合わせて形成され、さらに、そのC、M、Yの重ね合わせトナー像と同期が取られ、黒(K)の画像形成ユニット100によりKの感光体ドラム10上に形成された第4の色番号によるKの画像データに対応する裏面画像となるKのトナー像が、Kの転写器14bにおいて、Kの転写器14cによって、前記C、M、Yのトナー像の上からKのトナー像を重ね合わせて形成され、トナー像受像体14a上に裏面画像のC、M、Y及びKの4色の重ね合わせトナー像が形成される(図2(A))。

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【0043】転写後の各色毎の感光体ドラム10の周面上に残ったトナーは、感光体ドラムクリーニング手段であるクリーニング装置19に至り、感光体ドラム10に当接したゴム材から成るクリーニングブレード19aによってクリーニングされる。

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【0044】以上のようにしてトナー像受像体14a上に裏面画像となる重ね合わせたカラートナー像が形成されたのち、引き続きトナー像受像体14aに相対して、Cの感光体ドラム10上に形成されるCの裏面画像は、前記

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感光体ドラム10上に形成されるCの裏面画像は、前記

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Cの感光体ドラム10上に形成した裏面画像に対して鏡像となるように画像データが変更される。

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【0045】Cの感光体ドラム10上のCの裏面画像形成にともなう転写材である転写紙Pが転写材取手段である給紙カセット15より、送り出しローラ15a、ローラ15bへ搬送され、タイミングローラ15bの駆動によって、Cの感光体ドラム10上に相対されたCの裏面画像のトナー像と、トナー像受像体14aに相対されて裏面画像のトナー像との同期がとられてCの転写器14bへ給送される。この際、転写紙Pに当接状態とされトナー像と同極性(本実施形態においてはマゼンタ色)の直流電圧が印加された先端がブラシ状の転写器150により、転写紙Pがトナー像と同極性に紙帯電され、トナー像受像体14aに吸着されてCの転写器14bへ搬送される(図2(B))。トナー像と同極性に紙帯電を行うことにより、トナー像受像体14a上のトナー像とCの感光体ドラム10上のトナー像と引き合うことを防止して、トナー像の乱れを防止している。ブラシ状の転写器150に代わりコロナ帯電器を用いてもよい。

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【0046】Cの転写器14bではトナーと反転極性(本実施形態においてはプラス極性)の電圧が印加され、Cの転写器14cによってCの感光体ドラム10上の裏面画像が転写紙Pの表面に転写される。このとき、トナー像受像体14a上の裏面画像は転写紙Pに転写されないでトナー像受像体14a上に存在する。

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【0047】同様にして、トナー像受像体14aに相対されている裏面画像のカラートナー像とCの裏面画像のトナー像との同期が取られ、M、Y、Kそれぞれの裏面画像形成ユニット100によりM、Y、Kの裏面画像のトナー像が感光体ドラム10上に形成され、M、Y、Kの裏面画像のトナー像がM、Y、Kそれぞれの転写器14bでトナーと反転極性(本実施形態においてはプラス極性)の電圧が印加された各転写器14cによって各感光体ドラム10上のM、Y、Kの裏面画像のカラートナー像がM、Y、Kの間に転写紙Pの表面にCのトナー像の上に順次転写される。このとき、トナー像受像体14a上の裏面画像は転写紙Pに転写されないでトナー像受像体14a上に存在する。C、M、Y、Kの感光体ドラム10上に形成されるC、M、Y、Kの裏面画像は、前記C、M、Y、Kの感光体ドラム10上に形成した裏面画像に対してそれぞれ鏡像となるように画像データは変更される。

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【0048】裏面にカラートナー像が転写された転写紙Pは、トナーと反転極性(本実施形態においてはプラス極性)の電圧を印加した裏面転写器14gへと搬送され、裏面転写器14gによりトナー像受像体14aの周面上の裏面画像のカラートナー像が一括して転写紙Pの裏面に転写される。

【0049】また、紙帯電器150は転写紙Pの後端の通過の直前あるいは通過と同時にトナー像受像体14aより当接解除される転写紙Pと離間される(図2(C))。紙帯電器150への電圧の印加は転写紙Pの送りされているときのみであり、転写紙Pとの離間と同時に紙帯電器150への印加は停止される。

【0050】両面にカラートナー像が転写された転写紙Pは、次に駆動ローラ14dの曲率分離開除電器150によって曲率分離と併用して行われる転写材分離手段として、紙分離AC除電器14hの除電作用により、トナー像受像体14aから分離され、拍重162が設けられた搬送部160を経て、定着装置17へと搬送される。定着装置17において、転写紙Pは定着ローラ17aと圧着ローラ17bとの間で熱と圧力とを加えられることにより転写紙Pの裏面のトナー像が定着され、両面画像に転写がなされた転写紙Pは装置外部のトレイへ排出される。

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【0051】転写後のトナー像受像体14aの周面上に残ったトナーは、トナー像受像体14aを嵌んで後述されたローラ14fに對向して設けられた、支軸142を回転軸点としてトナー像受像体14aに当接及び当接解除可能でトナー像受像体14aに当接状態とされるトナー像受像体クリーニング装置140のトナー像受像体クリーニングブレード141によりクリーニングされる。

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【0052】また、転写後の各色毎の感光体ドラム10の周面上に残ったトナーは、クリーニング装置19のクリーニングブレード19aにより残留トナーを除かれ、不図示の帯電刷の一掃露光器により先の画像形成による感光体ドラム10上の残留が解消されて、次の画像形成サイクルにはいる。

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【0053】上記の両面画像形成装置では、上記の形態で説明したような転写材の両面に画像を形成する両面画像形成の他に、転写材の表面又は裏面のみの片側に画像を形成する片面画像形成もなされることは勿論である。

【0054】ここで、前記画像形成部A、画像データ処理部B、画像形成部Dからなる上記のカラー画像形成装置の回路構成を、図3及び図4のブロック図に従って説明する。

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【0055】先ず、画像形成部Aにおいて、前記の撮像素子CCDから出力される色分離した3色のアナログ画像信号は、A/D変換器B11によってディジタル画像信号(画像データ)に変換されて、インターフェイスB12を介して画像データ処理部B13に出力される。

【0056】画像データ処理部B13に入力されたディジタル画像信号は、A/D変換器B11によってディジタル画像信号(画像データ)に変換されて、インターフェイスB12を介して画像データ処理部B13に出力される。

【0057】そして、使用者の変換指定に従った変換処理が、拡大・縮小処理B14で行われる。また、画像利

するに最初と最後がシアン (C) と黒 (K)、その間がイエロー (Y) とマゼンタ (M) であればよい。

【0077】 頻度の高い黒 (K) 単色モードプリントのことを考えるとKの画像形成ユニット100はトナー像受像体14aの搬送方向の最下流に配置するのがプリント速度が早くなるので好ましい。

【0078】

【発明の効果】 本発明によるとは、両面にカラートナー像を保持した転写材を一括定着するタンデム型カラー画像形成装置において、装置のカラー画像の色調に差のない極めて良好な画質を得ることの可能なカラー画像形成装置が提供されることとなった。また、請求項2によるときは、Kの画像形成ユニット100はトナー像受像体14aの搬送方向の最下流に配置されるので単色黒プリント時のプリント速度を早くする効果が生じる。

【図面の簡単な説明】

【図1】 本発明の画像形成装置の一例を示す断面構成図である。

【図2】 トナー像形成機構と転写材の供給を示す説明図である。

【図3】 本発明に用いられる回路の一例を示すブロック図である。

【図4】 図3の画像補正処理の詳細を示すブロック図である。

【図5】 転写材の搬送における各色トナーの搬なり順を示す説明図である。

【図6】 実行されるカラートナーそれぞれの分光反射率曲線を示すグラフである。

【図7】 理想的なカラートナーそれぞれの分光反射率曲線を示すグラフである。

【符号の説明】

10 感光体ドラム (像形成体)

11 スクロトン帯電器

12 露光光学系

13 現像器

14a トナー像受像体 (中間転写体)

14c 転写器

14g 裏面転写器

14h 紙分離AC除電器

17 定着装置

A 画像群取り部

B 画像データ処理部

D 画像形成部

P 記録紙 (転写材)

機能とを切り換えつつ表面及び裏面の画像データの割り振りを行うためのデータセレクタB91と表/裏に対応した画像補正を行う画像補正処理B92とが設けられている。

【0066】 前記データセレクタB91は、画像記憶部B23から読み取りに応じて逐次出力される画像データの表/裏から一方を選択的に画像形成装置 (レーザプリンタ) B25に出力するものである。

【0067】 すなわち、前記画像記憶部B23には、通常にリアルタイム処理を行なうときと同じ最終出力状態の画像データが記憶され、前記データセレクタB91によって選択的に出力される画像データ処理部Bからの画像データと画像記憶部B23から読み出した画像データとは、画像形成装置B25において同等に扱われて画像形成が行えるようになっている。

【0068】 本発明の画像形成装置では、裏面画像は像形成体からトナー像受像体への転写及びトナー像受像体から転写材への2回の転写が行われる。一方、表面画像は像形成体から転写材への1回の転写が行われる。これら2回の転写に際しては1回に10%程度のトナー付着量が低下することにより、同条件で画像処理を行うときは裏面画像に比べ表面画像は画像濃度が低くなる。また表面画像では2回の転写によるトナー像の散りにより階調性が変化する。さらにカラー画像ではトナー像の重なり合わせの順序が、図5に示すように転写材上で反転しているため表面と裏面とで色調が変化する。Y、M、C3色の混合比からUCR量が求められるが、表面画像にあるのは最上層となるK (黒) が強調され過ぎる傾向があるため、表面画像と裏面画像とでは色再現に当たってUCR量を減らして、或いはK成分を裏面に較べ少なくすることが必要となる。

【0069】 また、カラー現像剤のトナーのシアン (C)、マゼンタ (M)、イエロー (Y) の理想的な分光反射率は図7に示す特性を有することが必要であるが、実際の代表的なトナーの分光反射率は図6に示すような特性を有する。

【0070】 シアン (C) トナーは特にカラーバランスが悪く緑色領域に不要な吸収特性を有して明度が低く黒に近い。従って、黒 (K) とシアン (C) とを重ね合わせ、表面画像の最終と裏面に重ね合わせるようにすることにより、両面画像形成時の表面画像と裏面画像とでトナーの重なり順序が反転することによる影響を少なくすることができ、

【0071】 本実施形態においては図4に示すように、画像補正処理B92の色処理B92.1において、マスキング部でマスキング・盛入れ・UCR等の色処理を含んで行われる。マスキングとしては一般に行われる線形マスキングあるいは高周波色補正を行う際には非線形マスキングやバックアップパターンを用いたマスキングが用

別処理B15においては、前記濃度変換B13で変換された濃度情報に基づいて文字画・写真画の判別を行い、該判別結果に基づいてフィルタ処理B16におけるフィルタ特性を設定し、フィルタ処理B16では、前記設定に従って空間フィルタ処理を行う。

【0058】 なお、前記画像判別処理B15が、本実施形態における画像判別手段及び処理特性可変手段に相当し、文字画・写真画の判別は文字画と写真画との差分画像における文字画像領域、写真画像領域の判別を含むものとする。

【0059】 ここで、拡大・縮小の指定に応じて、フィルタ処理と変換処理とを入れ換えを行わせるために、一方のデータセレクタB17、B18が設けられている。前記フィルタ処理と変換処理との入れ換えは、縮小処理時の画像に見られる端点画のモアレを防止するために行われる。

【0060】 一方、E処理B19は、本スキンの前のプリスキヤンで得られた画像情報から原稿画像の輪郭を得るために、ヒストグラムデータを得る。そして図示しない画像処理部CPUは、前記ヒストグラムデータに基づいて適正な補正データを補正処理B20に提供し、折り目消しなどの領域加工も行う。

【0061】 フィルタ処理・変換処理が施された画像データ (濃度情報) は、前記補正処理B20で後述する画像形成装置B25の特性に応じた補正が施された画像データとして出力される。前記画像形成装置B21においては、原稿の有効画像領域の抽出、枠消し、折り目消しなどの領域加工も行う。

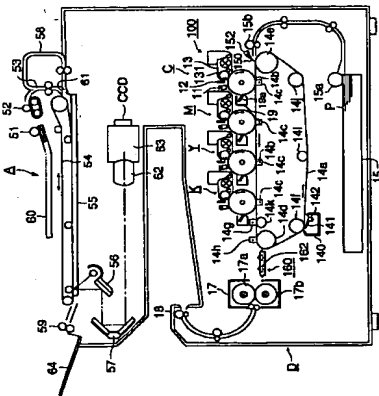
【0062】 上記のようにして画像形成に必要な全ての画像処理が施され、後述する画像形成装置B25への最終出力状態となった画像データ (濃度情報) は、インタフェイスB22を介して画像形成部Dに出力される。

【0063】 画像形成部Dにおいては、原稿の複製に対してリアルタイムに感光体ドラム10上への画像形成を行う機能と共に、入力された画像データを画像記憶部B23において複製記憶保持しておき、該記憶された画像データを後から任意に読み出すデータセレクタB91と、或/裏に於いて画像補正を行う画像補正処理B92と、補正された画像データより画像形成を行わせる機能を有している。

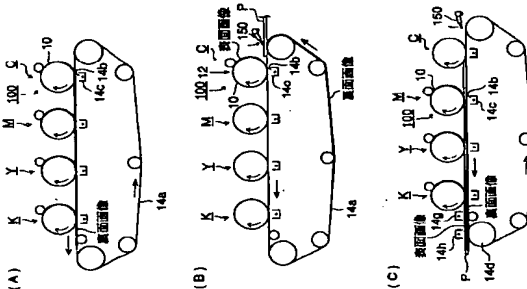
【0064】 ここで、本実施形態では、上記のように原稿画像を群取りで得られ、然も、必要な画像処理が全て施された画像データを保存しておき、該保存された画像データを後から選択的に読み出して画像形成を行わせる機能を電子RDRH機能と称するものとする。

【0065】 画像形成部Dには、レーザプリンタなどである画像形成装置B25の他に、前記電子RDRH機能を実現するため、画像データを書き換え可能に記憶する画像記憶部B23 (画像データ記憶手段) が設けられる一方、前記電子RDRH機能と通常のリアルタイム画像形成

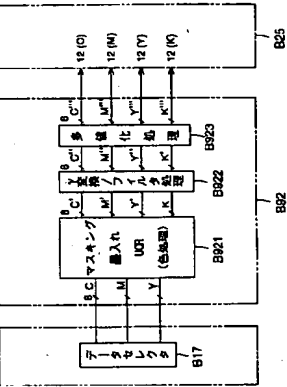
【図1】



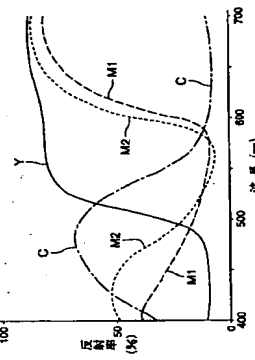
【図2】



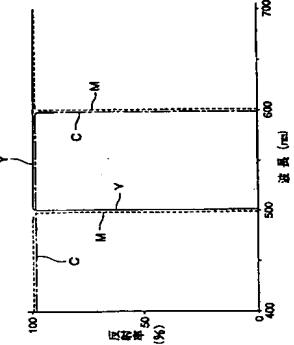
【図4】



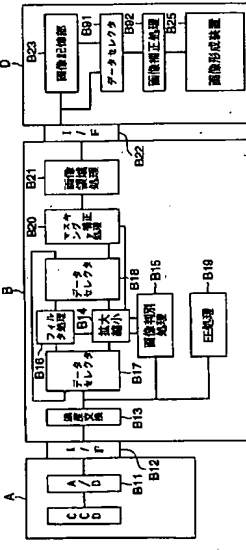
【図6】



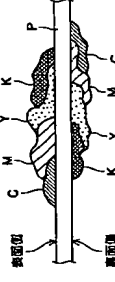
【図7】



【図3】



【図5】



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